TRAFFIC AND TRANSPORTATION

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SUMMARY OF CONCLUSIONS

Staff has analyzed the traffic related information provided in the Application for Certification (AFC) and other sources to determine the potential for the Humboldt Bay Repowering Project (HBRP) to have significant adverse traffic and transportation-related impacts. Staff has also assessed the availability of mitigation measures that could reduce or eliminate the significance of these impacts.

The applicant has not proposed any mitigation measures for traffic and transportation; however, staff has recommended conditions of certification to prevent significant adverse traffic and transportation-related impacts and to ensure that the project complies with applicable laws, ordinances, regulations, and standards (LORS) pertaining to traffic and transportation.

Staff concludes that:

- Although King Salmon Avenue would continue to operate at a level of service (LOS) acceptable to Humboldt County during project construction, the drop in LOS would be substantial; thus condition of certification **TRANS-1** should be implemented to require the execution of a Traffic Control Plan to reduce the impact of a decreased LOS along King Salmon Avenue.
- Condition of certification **TRANS-5** should be implemented during operation to reduce the potential for conflicts between school buses and vehicles delivering hazardous materials to the project site.
- Condition of certification **TRANS-4** should be implemented to reduce the potential of inadvertent over-flight by California Highway Patrol aircraft of the facility's thermal plumes and any resultant impacts on aircraft safety.

If the California Energy Commission (Energy Commission) elects to grant certification for this project, staff is proposing six conditions of certification.

INTRODUCTION

In the Traffic and Transportation section, staff addresses the extent to which the proposed HBRP may affect the traffic and transportation system within the vicinity of the project site. This analysis focuses on whether construction and operation of the HBRP would cause traffic and transportation impact(s) under the California Environmental Quality Act (CEQA) and whether the project would be in compliance with applicable LORS.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Traffic and Transportation Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation relevant to the proposed project.

TRAFFIC AND TRANSPORTATION Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14 Aeronautics and Space, Part 77 Objects Affecting Navigable Airspace (14 CFR 77)	This regulation establishes standards for determining physical obstructions to navigable airspace; sets noticing and hearing requirements; and provides for aeronautical studies to determine the effect of physical obstructions on the safe and efficient use of airspace.
CFR, Title 49, Subtitle B	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures), and provides safety measures for motor carriers and motor vehicles who operate on public highways.
State	
California Vehicle Code (CVC), Division 2, Chapter. 2.5, Div. 6, Chap. 7, Div. 13, Chap. 5, Div. 14.1, Chap. 1 & 2, Div. 14.8, Div. 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits.
Local	
2002 Humboldt 2025 General Plan Update	Establishes regional transportation goals, policies and implementation measures for various modes of transportation, including intermodal and multimodal transportation activities.
Humboldt County Public Works Department	Requires encroachment permits for projects that occur on county right-of-ways (ROW) and for road improvements.

SETTING

The proposed project site is situated on Buhne Point approximately 3 miles south of the city of Eureka, just north of the unincorporated community of King Salmon, and west of the unincorporated community of Humboldt Hill. The proposed site is within the sphere of influence of the city of Eureka and is located at 1000 King Salmon Avenue, Humboldt County, California on 5.4 acres within a 143-acre parcel currently occupied by the

existing PG&E Humboldt Bay Power Plant (HBPP). The site is currently zoned Coastal-Dependant Industrial and is within the jurisdiction of the California Coastal Commission (Coastal Commission).

Surrounding land uses include rural residential, port-related industrial, agricultural, and recreational uses. U.S. Highway 101 (Hwy 101) and State Route 299 (SR 299) are the two nearest primary transportation corridors to the HBRP site. There are three airports within the project vicinity: Eureka Municipal Airport (2.5 miles north), Murray Field Airport (6 miles northeast), and Eureka/Arcata Airport (23 miles north). Additionally, there is a railroad at the eastern boundary of the site (Northwestern Pacific Railroad) as well as bus/transit service (Redwood Transit System) with a bus stop on the east and west sides of the intersection of King Salmon Avenue and Hwy 101.

Parking for construction workers would be provided in a temporary construction parking area located off of King Salmon at the north end of the HBRP temporary construction access road. Construction workers would also park in a temporary remote parking area previously used by PG&E for HBPP construction activities. The parking lot is off King Salmon Avenue west of the HBRP temporary construction access road. In addition, a short-term delivery parking area adjacent to King Salmon Avenue would be used if necessary.

Access to the temporary parking and laydown area would be from a new temporary construction access road, which would be constructed immediately east of the HBPP intake channel. This road would be used to deliver equipment to the project laydown area, which would be within the HBPP site, north of the HBRP boundary and would be prepared at the onset of construction to enable the delivery of the engines, generators and auxiliary equipment. Engines would be delivered to the site and offloaded by the rigging contractor directly to their foundations. Auxiliary equipment would be delivered to the laydown area and offloaded by crane or forklift for later installation. Step-up transformers would be delivered to the switchyard area and assembled. Once the engines are delivered and set, the ventilation units would be installed on the engine hall. After all large equipment has been delivered; the on-site roadways and gravel areas would be completed.

CRITICAL ROADS AND FREEWAYS

Traffic and Transportation Table 2 identifies the critical roads and freeways in the vicinity of the project and the functioning characteristics of each roadway as presented by the applicant in the AFC (PG&E 2006a, Table 8.12-1).

Traffic and Transportation Figure 1 and Figure 2 show the regional and local transportation features as described in the AFC. **Figure 3** shows the locations of the Temporary Access Road and Parking Areas.

TRAFFIC AND TRANSPORTATION Table 2
Characteristics of Critical Roadways in Project Vicinity

Name	Classification	Hourly Design Capacity [a]	Average Daily Traffic Volume [b, c]	Truck Traffic [b]	Peak Hour Volume [b, c]
Regional					
Highway 101	Highway	7,200	27,000	9%	2,850
State Route 299	Highway	3,000	12,600	15%	1,200
Local					
King Salmon Avenue	Local Road	800	2,355	NA	NA

[a] Source: Transportation Research Board, 2000
[b] Source: State of California, Department of Transportation, 2004 & 2005
[c] Source: Garotte, 2006
NA = Not Available
Source: PG&E 2006a, page 8.12-2

The roadways discussion below is based on information contained in the Traffic and Transportation section of the AFC (PG&E 2006a, Page 8.12), as well as traffic data from the California Department of Transportation (Caltrans) and Humboldt County Public Works Department.

U.S. Highway 101

Hwy 101 is a north-south freeway located immediately east of the project area. Within the project vicinity, Hwy 101 is a four-lane roadway that connects Humboldt County north to Interstate 5 (I-5) via SR 299. Hwy 101 extends to areas south of Humboldt County along the coast including Ukiah and San Francisco. Most of the highway south of King Salmon Avenue is a four-lane freeway. To the north of King Salmon Avenue, there is a short section of freeway which continues as city streets through Eureka. North of Eureka, Hwy 101 continues as a fast two-lane road.

According to traffic counts conducted by Caltrans in 2005, Hwy 101 carries approximately 27,000 average daily vehicle trips in the vicinity of the project site (Caltrans, 2004 and 2005). Truck traffic accounts for approximately 9% of all trips based on 2004 data (Caltrans, 2005).

State Route 299

SR 299, which intersects Hwy 101 about 13 miles north of the HBRP site, connects Humboldt County east to Redding, where it connects to I-5. SR 299 in Humboldt County begins as a four-lane highway for approximately the first five miles. The rest of the highway is primarily a two lane (with an intermittent passing lane on ascending grades) scenic and winding route.

According to traffic counts collected by Caltrans in 2005, SR 299 carries approximately 12,600 average daily vehicle trips in the vicinity of the project site, approximately 15% of which are comprised of truck traffic. The hourly design capacity of SR 299 is 3,000 vehicle trips and the peak hour volume is 1,200 (PG&E 2006a, Page 8.12-1 & 8.12-2).

King Salmon Avenue

King Salmon Avenue is a county-maintained road between Hwy 101 and the community of King Salmon. It is also the main access road to the entrance of the HBPP and the

HBRP site. King Salmon Avenue is lightly traveled by passenger cars and trucks. Heavy trucks are limited to those associated with plant operation.

According to the Humboldt County Public Works Department, King Salmon Avenue carried approximately 1,270 vehicles per day in June 1968, 2,290 vehicles per day in July 1970, and 2,355 vehicles per day in June 1973. Only total daily traffic counts were measured during county surveys; therefore, truck traffic and peak-hour volume data were not available for King Salmon Avenue (PG&E 2006a). The number of employees at the HBPP and the local population living and working along King Salmon Avenue has been relatively stable since 1973. Therefore, the traffic volume of 2,355 vehicles per day measured in 1973 is likely representative of current traffic volumes on King Salmon Avenue (PG&E 2006a, Page 8.12-2).

LEVEL OF SERVICE

"Level of Service" (LOS) is a qualitative measure describing operational conditions within a traffic stream. LOS is a term used to describe and quantify the congestion level on a particular roadway or intersection, and generally describes these conditions in terms of such factors as speed, travel time, and delay. The Highway Capacity Manual1 (HCM) defines six levels of service for roadways or intersections ranging from LOS A, which represents the best operating conditions, to LOS F, which represents the worst. A more detailed description of LOS is found in **Traffic and Transportation APPENDIX A.**

Humboldt County uses the LOS criteria, as defined by the 2000 HCM, to assess the performance of its street and highway system and the capacity of roadways. The requirements are specified in "*Moving Goods and People" report of the Humboldt County 2025 General Plan Update A Discussion Paper for Community Groups* (PG&E 2006a, Page 8.12-7). For road segments within Humboldt County, the acceptable level is a LOS "C" or better.

For county of Humboldt roadways, LOS C (delays of 20 to 35 seconds) is considered to be the limit of acceptable delay. LOS F represents the worst condition with gridlock and is typically unacceptable. See **Traffic and Transportation APPENDIX A** for further discussion.

Traffic and Transportation Table 3 summarizes the current volume-to-capacity (V/C) ratios and LOS for roadway segments in the project vicinity that may be affected by the project during construction and/or operation. The intersection near the project, King Salmon Avenue/Hwy 101, currently operates at LOS A.

1 The *Highway Capacity Manual* (HCM) is the most widely used resource for traffic analysis. The Highway Capacity Manual is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. The current edition was published in 2000.

TRAFFIC AND TRANSPORTATION Table 3
Level of Service Summary for Existing Conditions

Name	Segment	Hourly Design Capacity	Peak-Hour Volume	V/C	LOS
Hwy 101	East of King Salmon Avenue	7,200	2,850	0.39	A
King Salmon Avenue	HBRP to Hwy 101	800	353	0.44	A

Source: PG&E 2006a, p.8.12-8
V/C = Volume Capacity ratio

The California Highway Patrol provided staff a collision history from 2004 through October 2007 for local roadways and regional highways in the proximity of the project. The data includes collisions at the intersection of Hwy 101 and King Salmon Avenue and 500-feet from the project site. The traffic incident report states that in 2004 there were three traffic incidents, in 2005 there were five, 2006 there were seven, and through October 2007 there have been nine.

RAILWAYS

The North Coast Railroad Authority (NCRA) has full ownership of the Northwestern Pacific Railroad (NWP) from Arcata to Healdsburg and is a member of the Northwestern Pacific Railroad Authority JPA (joint powers authority) for the portion south of Healdsburg. The northern portion of the railroad was officially closed by the Federal Railroad Administration and is currently inactive (CEC 2007(a)). The HBRP site is located next to the northern portion of the railroad, which is currently inactive.

PUBLIC TRANSPORTATION

Public transportation in the greater Eureka area is provided by the Eureka Transit Service, Arcata and Mad River Transit System, and the Redwood Transit System. However, the Redwood Transit System is the only line that stops along Hwy 101 and King Salmon Avenue. The Redwood Transit System stops at King Salmon Avenue nine times per day between 6:00 a.m. and 10:00 p.m. (Redwood Transit, 2007).

In addition, there are two area schools with bus operations along King Salmon Avenue. The Eureka City Schools and the South Bay Union Elementary both operate Monday-through-Friday service with stops along King Salmon Avenue between 7:20 a.m. and 4:00 p.m. (CEC 2007(e) & CEC 2007 (f)).

BICYCLES & PEDESTRIANS

The majority of the roadways near the project site are narrow with narrow or no shoulders. There is no specially-designated bicycle or pedestrian lanes near the project site; however, all roads in Humboldt County are open to bicycle use. The closest specially-designated bicycle lanes are in the city of Eureka, approximately 3 miles north of the project site (PG&E 2006a, Page 8.12-9).

AIRPORTS

The only commercial airport in the project vicinity is the Eureka-Arcata Airport, located approximately 23 miles north of the HBRP site. This airport serves an average of 115 flights per day (AirNav, 2007). There are two general airports within the site vicinity. The

Eureka Municipal Airport is approximately two miles north of the project site and serves an average of 96 flights per week (AirNav, 2007). The Murray Field Airport is approximately six miles northeast of HBRP and serves an average of 179 flights per day (AirNav, 2007). The Eureka Municipal Airport is the closest to HBRP site and has one runway designated for powered aircraft.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

To determine whether there is a potentially significant impact generated by a project, staff reviews the project using the criteria found in the CEQA Guidelines Appendix G Environmental Checklist and applicable LORS utilized by other governmental agencies. Specifically, staff analyzed whether the proposed project would do the following:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Result in inadequate parking capacity, and;
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Although not included as Appendix G Traffic and Transportation items, staff also discusses potential traffic and transportation impacts pertaining to nearby school operations and the transportation of hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Construction Impacts and Mitigation

Construction Workforce Traffic

Facility construction is projected to take place over 18 months from Spring 2008 to Summer 2009. The maximum number of construction workers commuting to the project site during peak hours is estimated to be 236 daily workers. The peak daily round trips generated by construction traffic are estimated to be approximately 290, which would occur between months 11 and 12 of construction. A daily average of 118 round trips is expected. These trips would be generated by construction-related vehicles (construction workers, craft people, supervisory, support, and construction management personnel), delivery trucks and heavy vehicles commuting to and from the project site.

Construction activities would generally occur between the hours of 7 a.m. and 7 p.m., Monday through Saturday. However, additional hours may be necessary to compensate for schedule deficiencies, or to complete critical construction activities. **Traffic and Transportation Table 4** lists average and peak construction traffic estimates for the HBRP.

The construction workforce (carpenters, electricians, ironworkers, laborers, millwrights, etc.) is expected to come from Humboldt County, particularly from within the Eureka area. The workforce is expected to use southbound Hwy 101 to commute to/from the project site. The maximum expected traffic volume from construction workers commuting to and from the project site would be 236 vehicles commuting via Hwy 101 and accessing the project site from King Salmon Avenue.

Construction Truck Traffic

Truck traffic for the HBRP would be generated primarily by the delivery of construction materials to the project site and the hauling of materials from the project site. The delivery of construction materials and the hauling of materials from the project site would occur throughout the day, not just during peak hours. During some construction periods, including the startup phase of the project, some activities will continue 24 hours a day, 7 days a week.

The primary truck route would be along Hwy 101 to the King Salmon Avenue exit; then east along King Salmon Avenue to the project site. Truck access to the project site would be from King Salmon Avenue via a new temporary access road that crosses Buhne Slough south of Intake Canal and parallels the canal to the site. The HBRP truck access will be separate from the existing HBPP operations.

The applicant states that there would be deliveries of hazardous materials to the project site. During the construction period, small quantities of hazardous materials would be used (for example, cleaning solvents, paint, and antifreeze). No acutely toxic hazardous materials would be used onsite during construction.

Total Construction Traffic

Traffic and Transportation Table 4 summarizes the estimated average daily and peak total construction traffic to be generated during the construction period.

TRAFFIC AND TRANSPORTATION Table 4
Estimated Trip Generation During Average and Peak Construction Period

Vehicle Type	Average Daily Round Trips	Peak Daily Round Trips	Morning Peak Hour		Evening Peak Hour	
			In	Out	In	Out
Construction Personnel	101	236	236	0	0	236
Delivery Trucks	2	20	0	0	0	0
Heavy Vehicles & Trucks	15	34	0	0	0	0
Total	**118**	**290**	**236**	**0**	**0**	**236**

Source: PG&E 2006a p. 8.12-12

Traffic and Transportation Table 5 shows the predicted change to critical road segment LOS levels during construction of the HBRP project.

TRAFFIC AND TRANSPORTATION Table 5
Existing Level of Service and Estimated Construction Level of Service

Name	Segment	Hourly Design Capacity	Existing Peak-Hour Volume	Construction Peak-Hour Volume	Existing V/C	Construction V/C	Existing LOS	Construction LOS
Highway 101	East of King Salmon Avenue	7,200	2,850	3,086	0.39	0.43	A	A
King Salmon Avenue	Highway 101 to HBRP site	800	353	589	0.44	0.74	A	C

Source: PG&E 2006a p. 8.12-8 & 8.12-13

As shown in **Traffic and Transportation Table 5,** the addition of 236 vehicles would cause the LOS on King Salmon Avenue from Hwy 101 to the project site to decline during the peak hour from LOS A to LOS C. Although, the LOS C level is acceptable in Humboldt County (PG&E 2006a, Page 8.12-13) the drop in LOS from A to C is substantial and would be a noticeable impact to circulation along King Salmon Avenue. Therefore, staff is proposing condition of certification **TRANS-1** which would require the applicant to prepare a Traffic Control Plan prior to construction in order to reduce the impact of a decreased LOS along King Salmon Avenue. Hwy 101, east of King Salmon Avenue, currently operates at LOS A during peak-hours and would remain at LOS A during peak construction (PG&E 2006a. pg. 8.12-8 & 8.12 -13).

As noted above, construction-related truck traffic (deliveries to the HBRP site and hauling from the HBRP site) would occur throughout the day. Therefore construction-related truck traffic (54 daily trips at peak) is not expected to reduce LOS or substantially increase congestion. However, there is potential for unexpected damage to roads by vehicles and equipment within the project area. Therefore, staff is proposing condition of certification **TRANS-2** which would require that any road damaged by project construction be repaired to its original condition. This will ensure that any damage to local roadways will not be a safety hazard to motorists.

There were 3 traffic accidents during 2004, 5 in 2005, 7 in 2006 and there have been 9 traffic accidents through October 2007. Staff spoke with Officer Stein of the California Highway Patrol, Arcata Office on November 22, 2007. Officer Stein indicated that the number of traffic accidents fluctuates annually, however, there is nothing specific about this intersection that would contribute to an increase in traffic accidents. Nevertheless, the addition of construction traffic will increase traffic volume which would potentially increase the amount of traffic incidents along this section of the roadway. Therefore, **TRANS-1** is recommended to reduce the potential for additional traffic-related accidents at the intersection of Hwy 101/King Salmon Avenue.

Construction Workforce Parking and Laydown Area

The HBRP would be located in an area with no designated street parking. Construction workers would park in a temporary construction parking area that would be constructed at the north end of the temporary access road. Both the temporary access road and

construction parking area would be removed after construction and the area restored. Construction workers would also park in a temporary remote parking area previously used for construction of the HBPP (PG&E 2006a, page 8.12-6). This parking lot is located off King Salmon Avenue, west of the HBRP temporary construction access road and provides 104 parking spaces. Construction craft workers would walk to the HBRP construction site from the parking areas. The precise number of parking spaces at the proposed temporary construction parking area is unknown; however, this lot is larger (by area) than the temporary remote parking area and may be able to accommodate the balance of construction worker vehicles, however staff is currently unable to determine if these areas would provide enough parking to accommodate the 236 construction workers. Condition of certification **TRANS-1** requires the applicant to provide verification that the temporary construction areas would be able to accommodate 236 construction vehicles.

Hazards Due To A Street Design Feature

Primary access to the HBRP would be on King Salmon Avenue from the north side of the road via the proposed temporary access road. To accommodate delivery trucks and construction vehicles, the turning radius from King Salmon on to the temporary access road would need to be 35 feet wide. According to schematic design drawings provided in Data Response No. 64 and No. 65 (CH2MHILL 2007c), both King Salmon Avenue and the entrance to the proposed access road are 30 feet wide and intersect at a perpendicular orientation. Staff has determined (and confirmed by a professional transportation planner) that, in addition to the road improvements shown in these drawings, that the width and orientation of King Salmon Avenue and the temporary access road are sufficient to accommodate a safe turning radius (CEC 2007 G).

Linear Facilities

The HBRP would connect to the PG&E electrical transmission system on the project site. Therefore, no new right-of-way (ROW) or widening of roadways will be required and no traffic delays are expected.

Raw water for industrial processes and site landscape irrigation would be supplied via a direct connection to an onsite 6-inch diameter water pipeline from an exiting ground water well. However, domestic water required for non-process uses would be provided from a new 1,200-foot long 4- to 6-inch diameter pipeline connecting to the existing Humboldt Community Services District (HCSD) line that runs along King Salmon Avenue. This pipeline would be constructed under the temporary construction access road and would interconnect to the HCSD pipeline in King Salmon Avenue. Installation would have no impact on King Salmon Avenue traffic.

HBRP would connect to the on-site 10-inch diameter, high-pressure, natural gas pipeline. Therefore, no new ROW or widening of roadways would be required and no traffic delays are expected.

Proximity To Schools

The South Bay Union School District and the Eureka City Unified School District serve the HBRP site area. There are two elementary schools within 2.5 miles of the project site: Pine Hill Elementary School located on Vance Avenue approximately 2.5 miles

from the HBRP site and South Bay Elementary School, located on Loma Avenue approximately 0.35 mile from the HBRP site.

The proposed construction workforce travel route traverses Hwy 101, SR 299, and King Salmon Avenue and does not pass either of the above schools. However, there are several school bus stops in the King Salmon neighborhood located southwest of the HBRP that can only be accessed via King Salmon Avenue.

South Bay Union School District and Eureka City Schools provide school bus service at several stops within this neighborhood Monday through Friday between 7:00 a.m. and 8:00 a.m and between 2:00 p.m. and 4:00 p.m. (CEC 2007 (e)). However, construction-related traffic would not pass any of these bus stops and would therefore not present a safety hazard to students waiting at or walking to or from a bus stop.

Operation Impacts and Mitigation

Operation Workforce Traffic

Operation of the HBRP would require 17 employees. However, since the HBRP would include demolition of certain HBPP structures and operations, there would be no net increase in permanent employees as result of the HBRP. Therefore, staff agrees with the applicant's traffic consultant that HBRP operations would not significantly impact traffic.

Truck Traffic

Operation of the HBRP would not result in substantial regular truck traffic. Truck traffic associated with operation of the HBRP would not exceed 20 trips per month, except in the event of an emergency which could require up to 24 deliveries of diesel fuel per day (see **Traffic and Transportation Table 6**). However, the expected average daily truck deliveries under normal operation conditions would be two or less trips per day.

Although regular service vehicles and delivery of materials would generally arrive during normal business hours, all deliveries of hazardous materials would occur outside of normal commute times (PG&E 2006a, Page 8.12-15). The addition of this limited number of truck trips would have a negligible effect on overall traffic volume, congestion, and LOS along any of the routes or roadway intersections normally used for these deliveries, except as indicated in **Transportation of Hazardous Materials** below.

TRAFFIC AND TRANSPORTATION Table 6
Operational Truck Traffic

Delivery Type	Number & Occurrence of Trucks
Aqueous ammonia	8 per month
Cleaning chemicals	1 per month
Diesel (normal, gas mode operation)	1 per month
Diesel (emergency diesel operation)	1 per hour
Trash pickup	1 per week
Lubricating oil	31 per year
Lubricating oil filters	4 per year
Laboratory analysis waste	4 per year
Oily rags	4 per year
Oil absorbents	4 per year
Water treatment chemicals	Up to 2 per year

Source: PG&E 2006a p. 8.12-15

Onsite Parking

The Humboldt County Community Development Services provides *Non-Residential Parking Standards* for industrial uses. The calculation is based on the square footage of the proposed building. Although there is no specific parking standard for power generation facilities, the parking standard for manufacturing facilities allows one space for each 1,500 square feet of gross floor space or one space for each employee at the peak shift, whichever is higher. The parking standards for warehouse facilities allow one parking space for each 2,500 square feet of gross floor area or one space for every four employees, whichever is higher. The regular parking space must be at least 18-feet long and 8-feet wide. The project site would have sufficient area to provide the required on-site parking should these standards apply.

The applicant did not cite specific parking requirements, measurements, or spaces for operation in the AFC; however, since the net number of employees of the facility is not expected to change, an increase in parking demand is also not expected. However, to ensure that operational parking would be adequate, staff has proposed condition of certification **TRANS-3**, which would require the applicant to provide adequate parking as needed for operational and maintenance staff. **TRANS-3** would demonstrate coordination with the Coastal Commission and/or Humboldt County Community Development Service Department for onsite parking.

Airports

Staff's experience is that the hot exhaust generated by a power plant can disturb atmospheric stability above a power plant up to 1,000 above ground level (AGL), resulting in turbulence with the potential to affect aircraft maneuverability. The Eureka Municipal Airport, located approximately 2.5 miles north of the HBRP, is the closest airport to the project site. This airport is a public general-aviation airport with one runway designated for powered aircraft. There are, on average, 96 flights per week from the Eureka Municipal Airport with 18 aircraft based on the field: 16 single engine airplanes and two ultra-lights. The Engineering Department of the city of Eureka oversees the operation of the Eureka Municipal Airport (FAA Identifier O33). Flight patterns for this airport do not over fly either Humboldt Bay or the city of Eureka and the HBRP would be located well outside its flight patterns (COE 2007). The county facilities at Murray Field Airport are over five miles east of the Eureka Municipal Airport and its

flight patterns are even more removed from the location of the proposed site (COE 2007). Therefore, staff concludes that hot exhaust from the HBRP would not affect aircraft maneuverability of aircraft from area airports.

In addition the HBRP does not have any structure exceeding 200 feet in height, which would require notifying the FAA of a potential hazard to air traffic.

Staff spoke to Sergeant Larson of the California Highway Patrol (CHP), Humboldt Area Office, on November 7, 2007. Sergeant Larson informed staff that the CHP currently conducts monthly deployments out of the Redding Field Office for traffic enforcement. The CHP primarily uses airplanes for traffic enforcement. The airplanes fly at a minimum of 500 feet AGL. The CHP also uses helicopters but they are primarily for transport and emergencies. The CHP flies over Hwy 101 and SR 299 at a minimum of two to three times per month and a maximum of four to five times per month. Staff recommends that the applicant send a written notification to the CHP, Humboldt Area Office informing them of the start date of commercial operation for the power plant, and advising them that potential turbulence caused by thermal plumes emitted from the cooling towers and combustion turbine generator stacks may adversely affect aircraft flying directly over the power plant. Staff has proposed condition of certification **TRANS-4** which requires the applicant to submit written notification to the CHP, Humboldt Area Office.

Emergency Services Vehicle Access

The Humboldt Fire District Station Number 12, Bayview, provides 24-hour fire protection to the HBPP site and would provide service to the HBRP once operational. Station 12 is staffed by three personnel who cover the southern end of the Fire District. Station 12 is the first station required to respond to the HBPP. One of the department's reserve engines, Engine 14, is housed at Station 12, in addition to Engine 12. In the event of an emergency at the HBRP during construction, the emergency vehicles would enter the project site via King Salmon Avenue. The temporary access road would allow for adequate access into the facility. As discussed above, the temporary access road would have a turning radius of sufficient length to accommodate large trucks and construction vehicles and therefore would also be able to accommodate emergency vehicles.

The permanent plant access to the site will be provided by the existing access road into the HBPP from King Salmon Avenue and would allow for adequate access into and out of the facility during construction and operations. Additionally, there would be adequate room for emergency vehicles to turn around within the facility boundaries. For a more detailed discussion of emergency services serving the facility refer to the **Worker Safety and Fire Protection** section in this Preliminary Staff Assessment (PSA).

Transportation of Hazardous Materials

Operation of HBRP would result in the generation of wastes including lubricants, water treatment chemicals, herbicides and pesticides, and sludge. During operation of the HBRP, trucks would deliver and haul away aqueous ammonia, sulfuric acid and other hazardous materials. The applicant estimates a maximum of eight truck deliveries a month with an average of two truck trips per week to the site. The primary designated hazardous materials route for the HBRP is Hwy 101 to the King Salmon Avenue exit,

then northwest along King Salmon Avenue to the HBRP site. Staff agrees with the applicant that this route is suitable and would minimize off-freeway travel and avoids passing directly by any local schools. However, as discussed above, school buses travel along King Salmon Avenue past the project site. School bus traffic occurs Monday through Fridays between 7:00 a.m. and 8:00 a.m and between 2:00 p.m. and 4:00 p.m. Therefore, to avoid potential conflicts or accidents between school buses and vehicles transporting hazardous materials staff has proposed condition of certification **TRANS-5** which requires the applicant to schedule delivery of hazardous materials to the site so as not to coincide with school bus traffic.

Although the transportation and handling of hazardous materials (i.e. aqueous ammonia) can increase roadway hazard potential, impacts associated with the hazardous materials can be mitigated to a level of insignificance by compliance with existing federal and state standards established to regulate the transportation of hazardous substances. These standards constitute a comprehensive regulatory program whose purpose is to ensure the safety of hazardous materials transportation. Staff has assessed the efficacy of these standards and finds that they are successful in minimizing the risks associated with hazardous materials transportation. The applicant stated that delivery of hazardous materials will comply with Caltrans, U.S. Environmental Protection Agency, California Department of Toxic Substances Control, CHP, and California State Fire Marshal regulations (PG&E 2006a, Section 8.5.4.2.4).

Specific sections of the California Vehicle Code and the California Streets and Highways Code ensure that the transportation and handling of hazardous materials are done in a manner that protects public safety. Enforcement of these statutes is under the jurisdiction of the CHP.

The California Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to check weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are required to take instruction in first aid and procedures on handling hazardous waste spills. Drivers transporting hazardous waste are required to carry a manifest, which is available for review by the CHP at inspection stations along major highways and interstates.

The applicant would be required to comply with all LORS governing the transport, storage, and use of hazardous materials. For a more detailed discussion on the handling and disposal of hazardous substances, see the **Hazardous Materials Management** section of this PSA.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130.).

The Independent Spent Fuel Storage Installation (ISFSI) is an underground facility to provide long-term, safe storage of the spent fuel rods currently stored within Unit 3 of

the HBPP. The ISFSI is the first step in decommissioning Unit 3, which ceased operations in 1976. The ISFSI was certified by the Coastal Commission on September 15, 2005. The activities undertaken for the decommissioning of Unit 3 would intersect with HBRP activities. There is, currently, no definite schedule for Nuclear Regulatory Commission (NRC) approved decommissioning activities; however, the HBRP applicant states that final decommissioning of Unit 3 would not be likely to occur during construction of the HBRP, due to the long lead times needed for site characterization and NRC approval.

Construction of the HBRP would directly result in the cessation of operation of the HBPP; however, the HBRP would not directly result in demolition of any of the structures and associated equipment that comprise Units 1 and 2 (PG&E 2006a, Page 2-4). As stated in the HBRP AFC, the demolition of Units 1 and 2 is not necessary to construct the HBRP; in fact, Units 1 and 2 need to be fully operational to serve the Humboldt County load until the HBRP is constructed, commissioned, and fully operational. Therefore, the HBRP and the demolition of Units 1 and 2 would not have a cumulative impact.

The HBRP construction workforce traffic, construction truck traffic, and hazardous materials truck traffic would not travel through areas with an identified minority or low income population. In addition, staff has determined that all significant direct or cumulative impacts specific to traffic and transportation resulting from the construction or operation of the project would be less than significant. Therefore, the proposed project does not introduce traffic and transportation-related environmental justice issues.

COMPLIANCE WITH LORS

Traffic and Transportation Table 7 provides a general description of applicable statutes, regulations and standards adopted by the federal government, the State of California, and Humboldt County pertaining to traffic and transportation with which the project is required to comply. Conditions of certification have been proposed to ensure project consistency with a LORS where it was not already mandated by federal or state regulations.

TRAFFIC AND TRANSPORTATION Table 7
Project Compliance With Adopted Traffic and Transportation LORS

Applicable Law	LORS Description and Project Compliance Assessment
Federal	
CFR, Title 14, Section 77 (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace [including temporary flight restrictions (TFR)].
	The project does not have any structures exceeding 200 feet in height and is beyond restricted airspace; therefore no notification to the FAA is required.
CFR, Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures), and specifies safety measures for motor carriers and motor vehicles who operate on public highways.
	Enforcement is conducted by state and local law enforcement agencies, and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting (e.g., Humboldt County Department of Public Works permits).
State	
California Vehicle Code, Division 2, Chapter. 2.5, Div. 6, Chap. 7, Div. 13, Chap. 5, Div. 14.1, Chap. 1 & 2, Div. 14.8, Div. 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials.
	Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting, and/or local agency permitting.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits.
	Enforcement is provided by state and local law enforcement, and through ministerial state agency licensing and permitting, and/or local agency permitting.
Local	
2002 Humboldt County 2025 General Plan Update	Establishes regional transportation goals, policies and implementation measures for various modes of transportation, including intermodal and multimodal transportation activities.
	Staff has proposed condition of certification **TRANS-1** which requires the preparation of a construction traffic control and implementation of this management plan. These plans includes timing of heavy equipment and building materials deliveries and

	scheduling of construction workforce start and end times to ensure the project meets the County's LOS C standards on project roadways; prevent additional traffic related accidents at King Salmon Avenue/Hwy 101 intersection; and require coordination for deliveries.
Humboldt County Public Works Department	Requires encroachment permits for projects that occur on County right-of-ways (ROW) and for road improvements.
	Staff has proposed condition of certification **TRANS-6** which requires the applicant to obtain encroachment permits prior to the start of construction.

NOTEWORTHY PUBLIC BENEFITS

Neither the applicant nor staff has identified any traffic related benefits associated with the HBRP.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments related to traffic and transportation.

CONCLUSIONS

In order for staff to make a determination if the construction parking areas are adequate and comply with all LORS, staff requires specific dimensions of parking areas and spaces, the number of parking spaces available, ingress/egress access points, and availability for use by construction workers. Staff needs the applicant to provide this information to be able to complete the Final Staff Assessment.

Staff has analyzed potential construction and operational impacts related to the regional and local traffic and transportation system by the proposed project and conclude the following:

- The construction and operation of the HBRP as proposed with the effective implementation of staff's recommended conditions of certification **TRANS-1** through **TRANS-6** would ensure that the project's direct adverse traffic and transportation impacts are less than significant and, ensure that the project complies with applicable LORS regarding traffic and transportation.
- During operation, workforce and truck traffic to and from the facility would not result in a substantial increase in congestion, deterioration of the existing LOS, or creation of a traffic hazard during any time in the daily traffic cycle and would have a less than significant adverse impact along the routes or roadway intersections that would be used to access the HBRP site.
- During construction and operation, the project would not generate commuter or truck traffic trips through a residential area or directly adjacent to a school facility or school bus stop.

- Condition of certification **TRANS-5** should be implemented during operation to reduce the potential for conflicts between school buses and vehicles delivering hazardous materials to the project site.
- Project-generated thermal plumes would not present a hazard to aircraft originating from area airports flying at or above 1,000 feet above ground level and the presence of the plant would not significantly influence the potential for an aircraft accident during normal airport operations.
- Condition of certification **TRANS-4** should be implemented to reduce the potential of inadvertent over-flight by California Highway Patrol aircraft of the facility's thermal plumes and any resultant impacts on aircraft safety.

Should the Energy Commission certify the project, staff recommends that the Energy Commission adopt the following conditions of certification.

PROPOSED CONDITIONS OF CERTIFICATION

Traffic Control and Implementation Plan

TRANS-1 The project owner shall prepare and implement a traffic control and implementation plan for the HBRP and its associated facilities, containing:

- A Traffic Management Plan (TMP) addressing the movement of vehicles and materials, including arrival and departure schedules outside of peak travel periods, designated workforce and delivery routes, hazardous materials delivery schedules outside of peak travel periods and school bus pick-up/drop-off and coordination with Caltrans, and other traffic-related activities and resulting impacts during construction of the project.
- Redirection of construction traffic with a flag person.
- Signing, lighting, and traffic control device placement.
- A Heavy Haul Plan (HHP), addressing the transport and delivery of heavy and oversized loads requiring permits from Caltrans or other state and federal agencies.
- A Parking Plan to ensure designated parking areas are adequate to accommodate construction workforce vehicles and parking spaces comply with county length and width dimensions.
- Access and entry for emergency service vehicles to the project site.

The project owner shall consult with the Coastal Commission, Humboldt County Public Works Department, and Caltrans in the preparation and implementation of the traffic control and implementation plan and shall submit the proposed traffic control plan to the Coastal Commission, Humboldt County and Caltrans in sufficient time for review and comment and to the Energy Commission Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan. The traffic control plan shall include and the applicant shall implement all elements normally required for review and permitting of a similar project. The project owner shall provide a copy of any written comments from the Coastal Commission,

Humboldt County or Caltrans and any changes to the traffic control plan to the CPM prior to the proposed start of construction.

Verification: At least 90 calendar days prior to the start of construction, including any grading or site remediation on the power plant site or its associated easements, the project owner shall submit the proposed traffic control and implementation plan to the Coastal Commission, Humboldt County Public Works Department and Caltrans for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the Coastal Commission, Humboldt County and Caltrans requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from either the Coastal Commission, Humboldt County or Caltrans, along with any changes to the proposed plan to the CPM for review and approval.

Repair of Public Right-of-Way

TRANS-2 The project owner shall restore all public roads, easements, and rights-of-way (ROW) that have been damaged due to project-related construction activities to original or near original condition in a timely manner.

Prior to the start of site mobilization, the project owner shall consult with Humboldt County and Caltrans (if applicable) and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the local jurisdiction and Caltrans consider postponement of public ROW repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Verification: At least 30-days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and ROW segment(s) and/or intersections and shall provide the CPM, the affected local jurisdiction(s) and Caltrans (if applicable) with a copy of these images.

Within 60 calendar days after completion of construction, the project owner shall meet with the CPM, the affected local jurisdiction(s) and Caltrans (if applicable) to identify sections of public ROW to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public ROW repairs, the project owner shall provide a letter signed by the affected local jurisdiction(s) and Caltrans stating their satisfaction with the repairs to the CPM.

Parking Standards

TRANS-3 The project owner shall comply with the applicable parking standards for project operation as established by the Coastal Commission and Humboldt County.

Verification: At least 30 days prior to start of construction, the project owner shall submit written evidence to the CPM that the project conforms to all applicable parking standards as established by the Coastal Commission and Humboldt County standards.

The submittal to the CPM shall include evidence of review by the Coastal Commission and Humboldt County.

CHP Notification

TRANS-4 Prior to the start of commercial operation the project owner shall submit written notification to the California Highway Patrol (CHP), Humboldt Area Office informing them of the start of commercial operation date for the power plant, and advising them that potential turbulence caused by thermal plumes emitted from the power plant's cooling towers and combustion turbine generator stacks may adversely affect aircraft flying directly over the power plant below an elevation of 1,000 feet above ground level.

Verification: The project owner shall provide to the CPM a copy of the transmittal letter submitted to the CHP, Humboldt Area Office.

The project owner shall provide any written comment(s) received on the written notification from the CHP, Humboldt Area Office to the CPM for review.

Hazardous Materials Transport Restriction

TRANS-5 During operation, the project owner shall schedule delivery of hazardous materials to the HBRP site so as not to coincide with school bus traffic along King Salmon Avenue.

Verification: At least 60 days prior to start of operation, the project owner shall submit a hazardous materials transport plan and implementation program to the CPM for review and approval that describes how the project owner will conform to this restriction. The project owner shall consult with the South Bay Union School District and the Eureka City Unified School District in developing the plan. The submittal to the CPM shall include evidence that the school districts were consulted.

Encroachment Permit

TRANS-6 Prior to any ground disturbance or obstruction of traffic (for example, temporary delays) within any public road, easement, or ROW, the project owner or its contractor(s) shall coordinate with the Humboldt County Public Works Department and Caltrans (if applicable) and obtain all required permits. All activities by the project owner or its contractor(s) shall comply with the applicable requirements of any affected local jurisdiction and Caltrans.

Verification: At least 20 days prior to ground disturbance or interruption of traffic in or along any public road, easement, or ROW, the project owner shall provide copies of all permit(s) received from Caltrans or other affected jurisdiction to the CPM. In addition, the project owner shall retain copies of the issued/approved permit(s) and supporting documentation in its compliance file for a minimum of 180 calendar days after the start of commercial operation.

REFERENCES

Caltrans 2002. California Airport Land Use Planning Handbook. California Division of Aeronautics, Department of Transportation (Caltrans Aeronautics); January 2002.

CCR 2006. California Code or Regulations, Chapter 3 (CEQA Guidelines), Article 17, §§15250-15253; as amended on July 11, 2006.

CEC 2007(a). – California Energy Commission/S.Goulet ROC Report of Conversation – Traffic and Transportation Railroad Use. 11/6/2007.

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CEC 2007(c). – California Energy Commission/S.Goulet ROC Report of Conversation – Traffic and Transportation Permits & Construction, County of Humboldt. 11/7/2007.

CEC 2007(d). – California Energy Commission/S.Goulet ROC Report of Conversation – Traffic and Transportation Permits & Construction, California Coastal Commission. 11/7/2007.

CEC 2007(e). – California Energy Commission/S.Goulet ROC Report of Conversation – Traffic and Transportation School Bus Stops, Eureka City Schools. 11/7/2007.

CEC 2007(f). – California Energy Commission/S.Goulet ROC Report of Conversation – Traffic and Transportation School Bus Stops, South Bay Union. 11/7/2007.

CEC 2007(g). – California Energy Commission/J.Ricks ROC Report of Conversation – Turning Radius. 11/16/2007.

CH2MHILL 2007c – CH2MHill/D. Davy (tn: 39225). Applicant's Responses to CEC Staff's Data Requests 58 – 78 and Workshop Queries 1 - 22. 2/13/2007. Rec'd 2/13/2007.

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COH(a). Humboldt County General Plan Update, Moving Goods and People. January 2003.

COH(b). Eureka-Arcata Airport Master Plan, September 2003.

COH(c). Humboldt County Community Development Service, Non-Residential Parking Standards, http://co.humboldt.ca.us/planning/brochure/nrespark.htm. Accessed November 2007.

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FAA(a). Federal Aviation Administration (FAR) Part 77, Federal Aviation Administration, Title 14, CFR Part 77, Objects Affecting Navigable Airspace, Edition 1-1-04.

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TRAFFIC AND TRANSPORTATION APPENDIX A

HIGHWAY CAPACITY MANUAL

The Highway Capacity Manual is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. It represents a concentrated, multi-agency effort by the Transportation Research Board, the Federal Highway Administration, the American Association of Highway and Transportation Officials, and other traffic/transportation related agencies. It is the most widely used resource for traffic analysis. Several versions of the Highway Capacity Manual (HCM) have been published. The current edition was published in 2000. It contains concepts, guidelines, and computational procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, rural highways, and the effects of transit, pedestrians, and bicycles on the performance of these systems.

LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service are found in the Highway Capacity Manual 2000. The Highway Capacity Manual 2000 represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with level of service A representing the best operating conditions and level of service F the worst. Each level of service represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels. A general description of service levels for various types of facilities is shown in **Table A-1**.

Table A-1
Level of Service Description

Facility Type	Uninterrupted Flow	Interrupted Flow
	Freeways Multi-lane Highways Two-lane Highways Urban Streets	Signalized Intersections Unsignalized Intersections - Two-way Stop Control - All-way Stop Control
Level of Service		
A	Free-flow	Very low delay
B	Stable flow. Presence of other users noticeable.	Low delay
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay
D	High density stable flow	Tolerable delay
E	Unstable flow	Limit of acceptable delay
F	Forced or breakdown flow	Unacceptable delay

Source: Highway Capacity Manual 2000

Interrupted Flow

One of the more important elements limiting, and often interrupting the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals, stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Specifically, level of service criteria for traffic signals is stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume to capacity ratio for the lane group.

For each intersection analyzed the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A level of service designation is given to the control delay to better describe the level of operation. Descriptions of levels of service for signalized intersections can be found in **Table A-2**.

Table A-2
Description of Level of Service for Signalized Intersections

Level of Service	Description
A	Very low control delay, up to 10 seconds per vehicle. Movement forward (progression) is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase does not serve a waiting line of vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation, arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.

Source: Highway Capacity Manual 2000

The use of control delay, often referred to as signal delay, was introduced in the 1997 update to the Highway Capacity Manual. It represents a departure from previous updates. In the third edition of the Highway Capacity Manual, published in 1985 and the 1994 update to the third edition, delay only included stop delay. Thus, the level of service criteria listed in Table B differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the Highway Capacity Manual and represent a revision of the methodology published in the 1994 update to the 1985 Highway Capacity Manual. The revised procedures use control delay as a measure of effectiveness to determine level of service. Delay is a measure of driver discomfort, frustration, fuel consumption, and

increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay is determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A level of service designation is given to the expected control delay for each minor movement. Level of service is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through an all-way stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in **Table A-3**.

Table A-3
Description of Level of Service for Two-Way Stop Controlled Intersections

Level of Service	Description
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of acceptable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.

Source: Highway Capacity Manual 2000

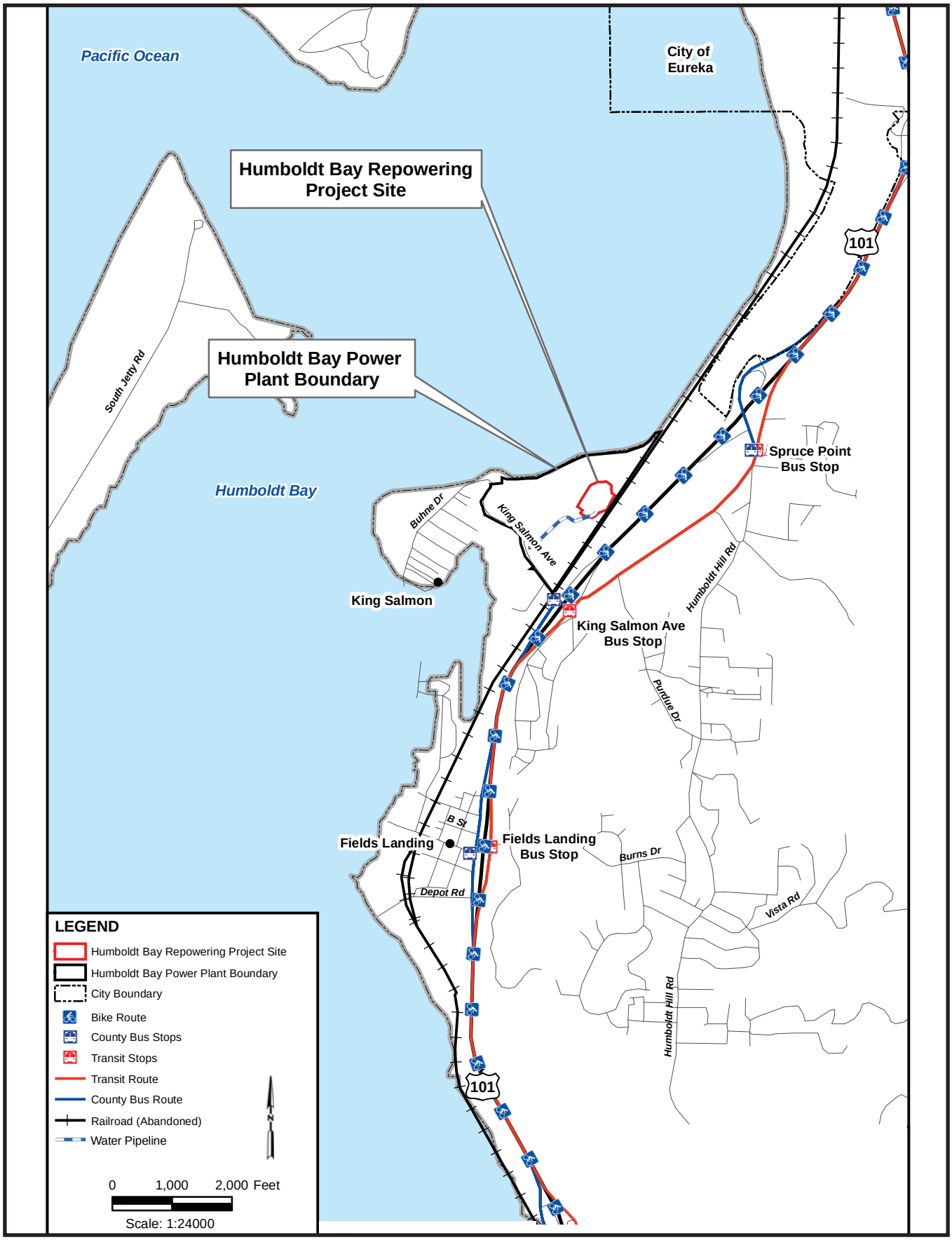
REFERENCE

Transportation Research Board. Highway Capacity Manual 2000. Washington, D.C.

TRAFFIC AND TRANSPORTATION - FIGURE 1
Humboldt Bay Repowering Project - Regional Transportation System

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, NOVEMBER 2007
SOURCE: AFC Figure 8.12-1

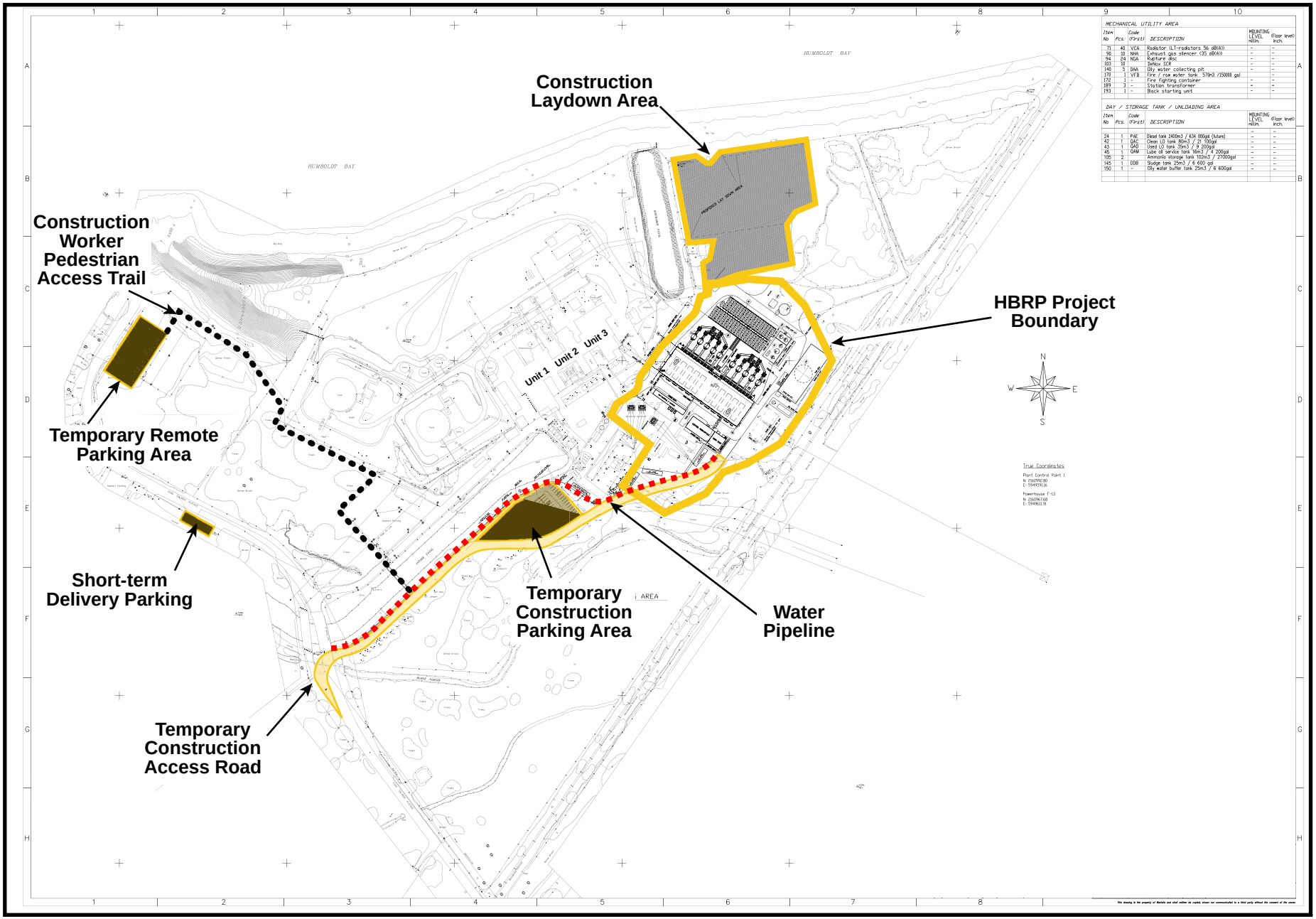
TRAFFIC AND TRANSPORTATION - FIGURE 2
Humboldt Bay Repowering Project - Local Transportation System



CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, NOVEMBER 2007
SOURCE: AFC Figure 8.12-2

TRAFFIC AND TRANSPORTATION - FIGURE 3

Humboldt Bay Repowering Project - Temporary Access Road and Parking Areas



CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, NOVEMBER 2007

SOURCE: AFC Figure 2.3-1